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Course Information

CS/ECE 2330 Digital Logic Design

Course Description

Or, so you want to learn how to be a computer engineer

ECE2330 (Digital Logic Design) provides an introduction to the analysis and design of digital systems from switches to gates to components to CPU. The analysis and design of combinational and sequential components includes multiplexers and demultiplexers, decoders and encoders, comparators, adders and ALU, registers and register files, counters and timers, RTL design, culminating in the design of a simple computer system.

Course Learning Objectives

Or, OK then this is what you need to do to learn how to be a computer engineer

Upon successful completion of this course, you will be able to

1. Design information processing systems
 - Information is represented by discrete-time, digital signals represented using logic value, 0 and 1.
 - Processing is accomplished using digital hardware
2. Develop a test plan to verify that the implementation you specify satisfies the requirements
3. Verify the operation of the implementation
 - Verification is accomplished by the generation and application of test vectors inputs, and then comparison of the actual and expected outputs

The course schedule is structured around the design of this simple computer system. Throughout the semester, you complete 1 or more lessons that provide the knowledge and skills needed to then complete a portion of the computer system design.

Time and again as an engineering student (and as a professional engineer), you will be asked to develop a solution to a problem and then verify that your solution is correct by developing evidence in support of your solution. In this course, the systematic approach to problem solving in support of verification involves two different approaches to solve a given engineering problem: ***analytical and numerical***.

For each portion of the computer system design, you will develop an analytical design that satisfies the requirements, and then numerically verify that the circuit you specify satisfies the requirements with a digital circuit simulator.

Prerequisites

- None

Course Credits

This is a 3-credit course that meets for three 50-minute class meetings per week

Course Assessments

Or, how you will be rewarded for your excellent work as you learn to be a computer engineer

In this course, there are 4 means by which you will be assessed, to ensure that the grade you are awarded accurately represents to the greatest extent possible your knowledge and understanding of the concepts presented and your ability to perform the skills demonstrated in this class.

Participation and Challenge Activities

A **participation activity** (PA) is usually an animation or learning question, for which a student's completion is visible to an instructor, and for which any student can get 100% completion just by participating. An animation's steps just need to be viewed. A learning question must simply be eventually answered correctly, and answers are available to students.

Participation activities are NOT homework problems or quizzes. Nor are PAs supplementary to the text. PAs are an integral part of the reading material. Many concepts only exist in PAs. The questions' *explanations* are key elements, especially for wrong answers that seek to break down misconceptions (a proven-important part of teaching).

A **challenge activity** (CA) requires the student to answer correctly, without us giving away the exact answer. A CA is comparable to traditional homework: Small tasks that give students practice. In education lingo, they are *formative assessments*. CAs give immediate feedback, aiding learning. Some CAs are algorithmically-generated. Some provide solutions if a wrong answer is entered, requiring the student to then answer a different problem. Some are "progressions," algorithmically-generating an easy problem initially and increasing in difficulty (usually 3-5 levels) after the student gets a level right. We are striving to make more challenge activities to be in progression form.

In general, neither of these are accepted after the deadline, because they are considered milestones in the learning process.

Exams

There are three exams administered throughout the semester and a final exam administered during the examination period (see the [Academic Calendar](#) for the scheduled date/time).

Final Project

For the final project, every student will design a simple computer system, verifying each portion of the design. In addition, you are required to document your design and verification with lab reports, which are the basis for the grade you are awarded. Typically, if late submissions are accepted, your grade will be penalized 20% for each day that it is late.

Course Hospitality

Students with disabilities or learning needs

It is my goal to create a learning experience that is as accessible as possible. If you anticipate any issues related to the format, materials, or requirements of this course, please meet with me outside of class so we can explore potential options. Students with disabilities may also wish to work with the Student Disability Access Center to discuss a range of options to removing barriers in this course, including official accommodations. Please visit their website for information on this process and to apply for services online: sdac.studenthealth.virginia.edu. If you have already been approved for accommodations through SDAC, please send me your accommodation letter and meet with me so we can develop an implementation plan together.

Discrimination and power-based violence

The University of Virginia is dedicated to providing a safe and equitable learning environment for all students. To that end, it is vital that you know two values that I and the University hold as critically important:

1. Power-based personal violence will not be tolerated.
2. Everyone has a responsibility to do their part to maintain a safe community on Grounds.

If you or someone you know has been affected by power-based personal violence, more information can be found on the UVA Sexual Violence website that describes reporting options and resources available - www.virginia.edu/sexualviolence.

As your professor and as a person, know that I care about you and your well-being and stand ready to provide support and resources as I can. As a faculty member, I am a responsible employee, which means that I am required by University policy and federal law to report what you tell me to the University's Title IX Coordinator. The Title IX Coordinator's job is to ensure that the reporting student receives the resources and support that they need, while also reviewing the information presented to determine whether further action is necessary to ensure survivor safety and the safety of the University community. If you wish to report something that you have seen, you can do so at the [Just Report It portal](#). **The worst possible situation would be for you or your friend to remain silent when there are so many here willing and able to help.**

Religious accommodations

It is the University's long-standing policy and practice to reasonably accommodate students so that they do not experience an adverse academic consequence when sincerely held religious beliefs or observances conflict with academic requirements.

Students who wish to request academic accommodation for a religious observance should submit their request in writing directly to me by [email](#) as far in advance as possible. Students who have questions or concerns about academic accommodations for religious observance or religious beliefs may contact the University's Office for Equal Opportunity and Civil Rights (EOCR) at UVAEOCR@virginia.edu or 434-924-3200.

Honor

I trust every student in this course to fully comply with all of the provisions of the University's Honor Code. By enrolling in this course, you have agreed to abide by and uphold the Honor System of the University of Virginia, as well as the following policies specific to this course.

1. All graded assignments must be pledged where indicated as such.
2. For all assessments, you are required to sign the University of Virginia Honor pledge to indicate that:
 - You have not used any unauthorized resources,
 - Unauthorized resources include other current students, former students, teaching assistants, and other faculty. In addition, I will announce to you explicitly any restrictions regarding access to material (including the textbook, material on the Collab site, and material available on websites external to the Collab site). In general, for an assessment, I am the only authorized resource for assistance unless otherwise explicitly stated by me.
 - You did abide by any time limitations or constraints for the assessment, and
 - You solely performed any work as relates to the assessment.
3. For learning activities, you are encouraged to collaborate with other students. However, with regard to your submission, you are required to sign the University of Virginia Honor pledge to indicate that you have not used any unauthorized resources and what you submit was solely created by you, unless otherwise explicitly stated by me (for example, for a team-oriented learning activity where team submissions are permitted).
4. Except for assessments, you should feel free to consult with teaching assistants (both undergraduate and graduate) and use material available to you on the Collab site, as well as material accessible to you on websites external to the Collab site.
5. All suspected violations will be forwarded to the Honor Committee, and you may, at my discretion, receive an immediate zero on that assignment regardless of any action taken by the Honor Committee.

Please let me know if you have any questions regarding the course Honor policy. If you believe you may have committed an Honor Offense, you may wish to file a Conscientious Retraction by calling the Honor Offices at (434) 924-7602. For your retraction to be considered valid, it must, among other things, be filed with the Honor Committee before you are aware that the act in question has come under suspicion by anyone. More information can be found at <http://honor.virginia.edu>. Your Honor representatives can be found at: <http://honor.virginia.edu/representatives>.

Course Location and Time

Location	On-line Asynchronous
Date/Time	N/A

Teaching Assistants

Name	Contact Information	Office Hours: Location, Day(s), and Time(s)
Angus Chang	ac3zv@virginia.edu	Tues, Thurs, 5-6:00 PM EST - Discord , or Zoom by appointment
Sky Chen	sc4rdz@virginia.edu	Tues, Thurs, 5-6:00 PM EST - Discord
Nick Cooney	npc4crc@virginia.edu	Tues, Thurs: 5-6:30 PM EST - Group 3 Discord
Neil Dolan	neilhdolan@virginia.edu	Mon: 7-8 PM EDT Wed, Thurs: 6-7 PM EDT Link
Matthew Hankins	msh2rub@virginia.edu	Mon, Fri: 5:00 - 6:00 PM - Group 4 Discord
Ahmed Hussain	ahh6qxu@virginia.edu	Tues, Thurs: 5-6:30 PM EST - Group 3 Discord
Abel Resson	amr3gk@virginia.edu	Tue. + Thu. (5:00 - 7:00PM EST) — Discord - DLD (Group 6)
Alanna Zoscak	az5dd@virginia.edu	By appointment / request
Joseph Bannon	jb9war@virginia.edu	Tues, Thurs: 5-6:00 PM EST - Will email group 1 members prior to start https://virginia.zoom.us/j/91427874476?pwd=MWdCUW5UQTFnMk4rSUNwSDBqMWRJUT09
Prithvi Kinariwala	prk8cr@virginia.edu	Tues, Thurs: 5-6:30 PM EST - See Announcement for Zoom link
Brandon Brnich	bmb7qbg@virginia.edu	Tues, Thurs: 5-6:00 PM EST - Will email group 1 members prior to start

Name	Contact Information	Office Hours: Location, Day(s), and Time(s)
		https://virginia.zoom.us/j/91427874476?pwd=MWdCUW5UQTEnMk4rSUNwSDBqMWRJUT09
Kieran Humphreys	kdh8az@virginia.edu	Tuesday 6:00 - 7:00, Thursday 3:00 - 4:00, Group 4 Discord
Karim Shoorbajee	ks4fd@virginia.edu	Mon & Wed, 3:30pm-5:30pm - Group 6 discord
Tahsin Kazi	tk8dd@virginia.edu	Mon & Wed, 3:30-5:00pm EST, Thursday 7:00-8:00PM EST Link

Textbook Information

Textbook

For this course, we will be using an on-line textbook entitled [Digital Design](#) produced by zyBooks. You may purchase the book through the [UVA bookstore](#) by searching for 'ECE 2330'.

Once you order the book, you will receive instructions **in an email** from the bookstore on how to access your book on the zyBooks website.

If you do not receive such an email, please email the UVA Bookstore (textbook@virginia.edu).

Instructor Information

Instructor	Professor Todd DeLong
Office location	Thornton Hall, E208
Phone	434-924-6309
Email	tad2x@virginia.edu
Office Hours	MWF, 11 AM to 1 PM, or by appointment (Online Meeting)

Software

Digital Circuit Tool

For this course, we will be using the **Digital** circuit tool, which can be downloaded from Github [here](#).

The zip files contains executables that allow the program to execute natively on all major Operating Systems (OSs), including Windows, Mac OSX (**see below**), and Linux.

The executables execute a Java file, so you must have Java installed as well.

Note to Mac OSX users: If you are running the simulator under Mac OSX, some of the newer versions have security restrictions that prevent the simulator from access to the files on your computer.

This [video](#) explains how to open a **Terminal** window, navigate to the directory that contains the **Digital.jar** file, and then execute the command recommended by the developer: **java -jar Digital.jar**